Catalogue of American Amphibians and Reptiles.

WILSON, LARRY DAVID. 1973. *Masticophis.*

Masticophis Baird and Girard Whipsnakes

Masticophis Baird and Girard, 1853:98. Type-species *Masticophis ornatus* Baird and Girard, 1853, [= *Masticophis taeniatus girardi* (Stejneger and Barbour, 1917)], by original designation.

• CONTENT. Nine species are recognized: *M. anthonyi*, *M. aurigulus*, *M. barbouri*, *M. bilineatus* (three subspecies), *M. flagellum* (seven subspecies), *M. lateralis* (two subspecies), *M. mentovarius* (three subspecies), *M. striolatus*, and *M. taeniatus* (five subspecies). Of these, four occur in the United States and México, four are limited to México, and one extends from México into northern South America.

• DEFINITION. A colubrid snake genus with a divided nasal scale, a single loreal, two preoculars (lower much smaller), two postoculars, no suboculars, usually 2 + 2 to 2 + 3 temporals (but highly variable), normally 7 to 8 supralabials with the 4th or 4th and 5th entering the orbit, and 9, 10, or 11 infralabials with 4 in contact with the anterior chinshields. The dorsal scales are smooth with 2 apical pits, and are arranged in 15 or 17 straight (not oblique) rows at midbody and in 11, 12, or 13 rows posteriorly. Dorsal scale reduction is normally characterized by lateral and middorsal reductions and by a progressive decrease in row number from the neck to the vent. Ventrals range in number from 173 to 214 and are not notched or keeled. The anal plate is divided. Subcaudals are paired, and range in number from 91 to 160. Maximum total length is about 2600 mm, and the tail length/total length ratio ranges from 0.204 to 0.364. There are 16 to 23 solid maxillary teeth that gradually become longer and stouter posteriorly. Ranges in number of teeth on the other dentigerous bones are as follows: palatine, 11 to 17; pterygoid, 17 to 29; dentary, 17 to 25. Hypapophyses are present only on the anterior vertebrae. The hemipenis is bilobed with a single, oblique sulcus spermaticus extending onto the left lobe. Distally each organ is covered with spinulate calyces in 9 to 14 rows and proximally with spines in 2 to 6 rows. The spines increase in size toward the base of the organ and there are two enlarged basal spines present, one on either side of the sulcus spermaticus. The basal area is covered with small, scattered spinules and the apex is smooth. The adult color pattern is of three types, including (1) dark narrow crossbands on a paler ground color, (2) pale longitudinal lateral stripes on a darker ground color, and (3) dark dots, no more than one per scale, on a paler ground color. Ontogenetic pattern change may be present or not.

• DESCRIPTIONS AND ILLUSTRATIONS A general description of the genus and its constituent species is given by Ortenburger (1928).

More recent works on the various species are those of Brattstrom (1955) on *M. anthonyi*, Hensley (1950) and Lowe and Norris (1955) on *M. bilineatus*, Wilson (1970) on *M. flagellum*, Riemer (1954) on *M. lateralis*, Smith (1942), Roze (1953), and Lancini (1965) on *M. mentovarius*, and Gloyd and Conant (1934) and Smith (1941) on *M. taeniatus*. Illustrations of most of the species of *Masticophis* are included in the works cited above. Color illustrations of the species found in the United States are in Conant (1958) and Stebbins (1966). Black and white illustrations of these forms appear in a variety of field guides. *M. mentovarius* was pictured by Werler (1951). *M. barbouri* has not been illustrated. Baker, *et al.* (1972) illustrate the karyotypes of *M. flagellum* and *M. taeniatus* (2n = 36).

• DISTRIBUTION. Members of the genus occur throughout the southern half of the United States from North Carolina westward through Missouri and Kansas, thence northwestward through Utah to southern Idaho and south-central Washington. In México the range includes the Peninsula of Baja California as well as the remainder of the country except the higher elevations in the Sierra Madre Occidental. The range extends the length of Central America, primarily along the Pacific versant but also on the Atlantic versant in Guatemala, British Honduras, and Honduras. In South America one species occurs in northwestern Colombia and northern Venezuela. The members of this genus generally inhabit a wide variety of warm, dry environments in arid and semiarid habitats.

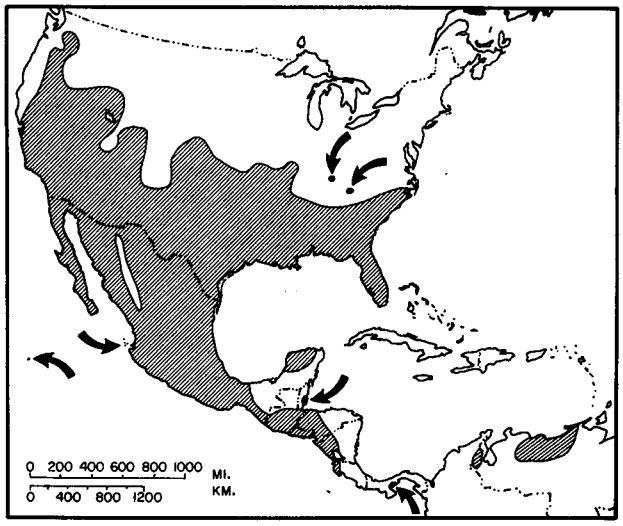
• FOSSIL RECORD. No exclusively fossil members of this genus are known and fossil records for extant species are limited to the Pleistocene and Recent epochs, generally within present-day range limits. Fossil records for members of this genus are listed by Brattstrom (1953, 1954, 1958, 1964), Langebartel (1953), Dowling (1958), Holman (1959, 1962), Auffenberg (1963), and Banta (1966). Documentation of the fossil history of *Masticophis* is hampered by the difficulty in differentiating fossil material of this genus from that of *Coluber* (Holman, 1962; Auffenberg, 1963).

• PERTINENT LITERATURE. The major taxonomic references are listed in the Descriptions and Illustrations section. Other important references are listed elsewhere in this account and in the species accounts.

• KEY TO SPECIES.

1. Seven supralabials, only one of which enters the orbit ..... *mentovarius*
   Eight supralabials, two of which enter the orbit 2
2. Dorsal scales in 15 rows anteriorly ..... *taeniatus*
   Dorsal scales in 17 rows anteriorly 3
3. Dorsal pattern consisting of light or dark lateral stripes on a contrasting ground color 4
   Dorsum without well-developed lateral stripes 7
4. Dorsal pattern of dark stripes on rows 2 and 3 broken at intervals by pale cream areas ..... *aurigulus*
   Dorsal pattern of pale stripes on dark background 5
5. Two or three pale lateral stripes on body, usually fading markedly on anterior third to half ..... *bilineatus*
   A single pale lateral stripe on body on rows 3 and 4 or rows 3, 4, and 5 6
6. Pale lateral stripe of even width, at least on anterior portion of body ..... *lateralis*
   Pale lateral stripe widening at intervals of 4 to 7 scales on anterior half of body ..... *barbouri*
7. Dorsal pattern of irregularly scattered dark lines, none longer than one scale, on a paler ground color ..... *anthonyi*
   Dorsal pattern variable, but if consisting of short, dark lines on a paler ground color, the lines evenly distributed 8
8. A dark spot at the base of every dorsal scale; no dark line along center of anterior dorsal scales ..... *striolatus*
   No dark spots at base of dorsal scales or if so a dark longitudinal line along center of anterior dorsal scales ..... *flagellum*

• REMARKS. The validity of the genus *Masticophis* has been discussed by several authors, some of whom prefer to



MAP 1. Distribution of the genus *Masticophis*.

unite it with *Coluber* (Brongersma, 1940; Bogert and Oliver, 1945; Auffenberg, 1955) and others of whom maintain its distinctness (Ortenburger, 1928; Smith, 1941). This controversy has been reviewed by Wilson (1970), who used the name *Masticophis*, maintaining that synonymizing that genus with *Coluber* would serve no useful end until a study of the latter genus demonstrates that such a move is taxonomically defensible.

Two species groups have been recognized in *Masticophis* (Ortenburger, 1928; Smith, 1941; Wilson, 1970): (1) a banded or unpatterned group containing *anthonyi, flagellum, mentovarius*, and *striolatus*, and (2) a striped group containing *aurigulus, barbouri, bilineatus, lateralis*, and *taeniatus*.

• ETYMOLOGY. The name *Masticophis* is derived from the Greek *mastix*, meaning whip, and the Greek *ophis*, meaning serpent, in reference to the whiplike form of the body and the braided appearance of the scales on the tail.

COMMENT

For many years *M. striolatus* (= *M. lineatus* auctorum) was regarded as a subspecies of *M. flagellum* (Smith and Taylor, 1945) but its specific distinctness has now been confirmed (Bogert and Oliver, 1945; Smith and Van Gelder, 1955; Zweifel and Norris, 1955; Webb, 1960; Fugler and Dixon, 1961; Hardy and McDiarmid, 1969). Recently, however, the specific distinctness of *M. striolatus* and *M. mentovarius* has been questioned (Webb, 1960; Zweifel, 1960). At one time they were considered as closely related vicariant forms (Zweifel, 1960) with *striolatus* ranging south along the Pacific coast to Guerrero, Morelos, and Puebla, México, and with *M. mentovarius* replacing it to the east and ranging from San Luis Potosí and Guerrero south into South America. *M. striolatus* has since been recorded from Oaxaca (Smith and Lynch, 1967), however, from which state *M. mentovarius* has long been known (Ortenburger, 1928). There is definitely a need for a range-wide study of *mentovarius* and *striolatus* with particular attention to areas where their ranges are contiguous or overlap. I suspect that such a study will demonstrate the conspecificity of the two.

M. aurigulus and *M. barbouri*, both from Baja California, remain poorly known.

LITERATURE CITED

Auffenberg, Walter. 1955. A reconsideration of the racer, *Coluber constrictor*, in eastern United States. Tulane Stud. Zool. 2(6):89–155.

— 1963. The fossil snakes of Florida. Tulane Stud. Zool. 10(3):131–216.

Banta, Benjamin H. 1966. A check list of fossil amphibians and reptiles reported from the state of Nevada. Biol. Soc. Nevada Occ. Pap. (13):1–6.

Baird, S. F., and C. Girard. 1853. Catalogue of North American reptiles in the museum of the Smithsonian Institution, Part I. Serpents. Smithsonian Misc. Coll. 2:1–172.

Baker, R. J., G. A. Mengden, and J. J. Bull. 1972. Karyotypic studies of thirty-eight species of North American snakes. Copeia 1972(2):257–265.

Bogert, Charles M., and James A. Oliver, 1945. A preliminary analysis of the herpetofauna of Sonora. Bull. Amer. Mus. Nat. Hist. 83(6):297–426.

Brattstrom, Bayard H. 1953. The amphibians and reptiles from Rancho La Brea. Trans. San Diego Soc. Nat. Hist. 11(14):365–392.

— 1954. Amphibians and reptiles from Gypsum Cave, Nevada. Bull. So. California Acad. Sci. 53(1):8–12.

— 1955. Notes on the herpetology of the Revillagigedo Islands, Mexico. Amer. Midl. Nat. 54(1):219–229.

— 1958. Additions to the Pleistocene herpetofauna of Nevada. Herpetologica 14(1):36.

— 1964. Amphibians and reptiles from cave deposits in south-central New Mexico. Bull. So. California Acad. Sci. 63(2):93–103.

Brongersma, L. D. 1940. Snakes from the Leeward Group, Venezuela and eastern Colombia. P. 115–137. *In* Hummelinck, Studies on the fauna of Curaçao, Aruba, Bonaire and the Venezuelan Islands 2(8).

Conant, Roger. 1958. A field guide to reptiles and amphibians of the United States and Canada east of the 100th Meridian. Houghton-Mifflin Co., Boston, xviii + 366 p., 40 pls.

Dowling, Herndon G. 1958. Pleistocene snakes of the Ozark Plateau. Amer. Mus. Novitates (1882):1–9.

Fugler, Charles M., and James R. Dixon. 1961. Notes on the herpetofauna of the El Dorado area of Sinaloa, Mexico. Publ. Mus. Michigan State Univ., Biol. Ser. 2(1):1–24.

Gloyd, Howard K., and Roger Conant. 1934. The taxonomic status, range, and natural history of Schott's Racer. Occ. Pap. Mus. Zool. Univ. Michigan (287):1–23.

Hardy, Laurence M., and Roy W. McDiarmid. 1969. The amphibians and reptiles of Sinaloa, México. Univ. Kansas Publ. Mus. Nat. Hist. 18(3):39–252.

Hensley, M. Max. 1950. Results of a herpetological reconnaissance in extreme southwestern Arizona and adjacent Sonora, with a description of a new subspecies of the Sonoran whipsnake, *Masticophis bilineatus*. Trans. Kansas Acad. Sci. 53(2):270–288.

Holman, J. Alan. 1959. Amphibians and reptiles from the Pleistocene (Illinoian) of Williston, Florida. Copeia 1959(2):96–102.

— 1962. A Texas Pleistocene herpetofauna. Copeia 1962(2): 255–261.

Lancini V., Abdem Ramon. 1965. Notas sobre as diferencas existentes entre as sub-especies venezuelanas de *Coluber (Masticophis) mentovarius* (Dum. Bibr. et Dum. 1854). Mem. Inst. Butantan 32:9–14.

Langebartel, Dave A. 1953. The reptiles and amphibians. *In* Hatt, Robert T. Faunal and archeological researches in Yucatan caves. Cranbrook Inst. Sci. Bull. 33:1–119.

Lowe, Charles H., Jr., and Kenneth S. Norris. 1955. Analysis of the herpetofauna of Baja California, Mexico. III. New and revived reptilian subspecies of Isla de San Esteban, Gulf of California, Sonora, Mexico, with notes on other satellite islands of Isla Tiburon. Herpetologica 11(2):89–96.

Ortenburger, Arthur Irving. 1928. The whip snakes and racers: genera *Masticophis* and *Coluber*. Mem. Univ. Michigan Mus., vol. 1, viii + 247 pp., 64 figs., 35 pls.

Riemer, William J. 1954. A new subspecies of the snake *Masticophis lateralis* from California. Copeia 1954(1): 45–48.

Roze, Janis A. 1953. The rassenkreis *Coluber (Masticophis) mentovarius* (Dumeril, Bibron et Dumeril), 1854. Herpetologica 9(3):113–120.

Smith, Hobart M. 1941. Notes on Mexican snakes of the genus *Masticophis*. J. Washington Acad. Sci. 31(9):388–398.

— 1942. Notes on *Masticophis mentovarius*. Copeia 1942(2): 85–88.

— and John D. Lynch. 1967. A new cryptic lizard (Iguanidae: *Sceloporus*) with comments on other reptiles from Oaxaca, Mexico. Herpetologica 23(1):18–29.

— and Edward H. Taylor. 1945. An annotated checklist and key to the snakes of Mexico. U. S. Natl. Mus. Bull. (187):iv + 239.

— and Richard G. Van Gelder. 1955. New and noteworthy amphibians and reptiles from Sinaloa and Puebla, Mexico. Herpetologica 11(2):145–149.

Stebbins, Robert C. 1966. A field guide to western reptiles and amphibians. Houghton-Mifflin Co., Boston, xiv + 279 pp., 39 pls.

Stejneger, Leonhard, and Thomas Barbour. 1917. A check list of North American amphibians and reptiles. Harvard Univ. Press, Cambridge, 125 pp.

Webb, Robert G. 1960. Notes on some amphibians and reptiles from northern Mexico. Trans. Kansas Acad. Sci. 63(4):289–298.

Wilson, Larry David. 1970. The coachwhip snake, *Masticophis flagellum* (Shaw): Taxonomy and distribution. Tulane Stud. Zool. Bot. 16(2):31–99.

Zweifel, Richard G. 1960. Results of the Puritan-American Museum of Natural History expedition to western Mexico. 9. Herpetology of the Tres Marias Islands. Bull. Amer. Mus. Nat. Hist. 119(2):77–128.

— and Kenneth S. Norris. 1955. Contributions to the herpetology of Sonora, Mexico: descriptions of new subspecies of snakes (*Micruroides euryxanthus* and *Lampropeltis getulus*) and miscellaneous collecting notes. Amer. Midl. Nat. 54:230–249.

L. D. WILSON, MIAMI-DADE JUNIOR COLLEGE, MIAMI, FLORIDA 33156

Primary editor for this account, Douglas A. Rossman.

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